Diving behavior of "southern resident" killer whales in the trans-boundary waters of British Columbia and Washington: implications for foraging ecology

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Diving behavior of air-breathing vertebrates may be influenced by a variety of factors including age, body size, and changes in prey behavior and/or abundance over both short and long time scales. It is widely accepted that the so-called "southern resident" killer whales feed primarily on salmon, yet the evidence to support this is limited. We studied the diving behavior and foraging ecology of this population in the inshore waters of southern British Columbia, Canada, and Washington, USA, using data from 34 suction-cup attached time-depth/swim speed recorders deployed between 1993 and 2002. We obtained dive data from approximately one third of the total population of "southern resident" killer whales within the summer core of their home range. Both sexes were well represented and we covered a wide range of ages and a large enough temporal scale (both in years and through the summer season) to broadly characterize the diving behavior of this population, at least during the summer months in the core part of their home range. Dive rates (# dives/h greater than or equal to specific depths) did not change with age or differ among pods or between males and females, although analyses restricted to adults only showed that adult males dove deep significantly more frequently than adult females during the day. For all whales, dive rates and swim speed were greater during the day than at night, suggesting decreased activity levels at night, although spikes in swim speed, likely related to fish chases, occurred as often at night as during the day. Dive rates to deeper depths during the day decreased over the study, suggesting a long-term change in prey behavior or abundance. While only 4% of their time is spent below 20 m in depth, 40% of the swim speed spikes occur below such depths. Depth increases during spikes in swim speed, suggesting that a large proportion of predation events occur out of sight of surface-based observers, making it difficult to assess diet based on surface-based observations.

References

Baird, R.W., M.B. Hanson and L.M. Dill. 2005. Factors influencing the diving behaviour of fish-eating killer whales: sex differences and diel and interannual variation in diving rates. Canadian Journal of Zoology 83:257-267.

Baird, R.W., and M.B. Hanson. 2004. Diet studies of "southern resident" killer whales: prey sampling and behavioral cues of predation. Report prepared as partial fulfillment of Order No. AB133F-03-SE-1070 to Cascadia Research Collective, Olympia, WA from the National Oceanic and Atmospheric Administration, Seattle, WA.

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